CLAIMS

1. A process for producing a crystalline thin film by melting and resolidifying a thin film, comprising the steps of:

(A) preparing a thin film having a specific region arranged at a predetermined position, the specific region being continuous to a surrounding non-specific region and different in melting or resolidification property from the surrounding non-specific region;

(B) locally melting and resolidifying a partial area including the specific region in the thin film; and

(C) locally melting and resolidifying another partial area including a non-specific region sharing a common boundary with an area crystallized by resolidification in a preceding step.

2. The process for producing a crystalline thin film according to claim 1, wherein the step (C) is repeated while shifting the area to be locally molten in one direction, whereby the crystallized area is made to grow in the direction of shifting.

3. The process for producing a crystalline thin film according to claim 2, wherein the step (A) is a step of preparing a thin film in which a plurality of specific regions are aligned in line, the step (B) is

a step of melting and resolidifying an area including two or more specific regions among the plurality of specific regions, and the step (C) is repeated while shifting the area to be locally molten in a direction almost orthogonal to a direction along which the plurality of specific regions are aligned.

4. The process for producing a crystalline thin film according to claim 2, wherein the step (A) is a step of preparing a thin film in which a plurality of specific regions are aligned in line, and the step of (C) is repeated while shifting the area to be locally molten in a direction along which the plurality of specific regions are aligned.

5. The process for producing a crystalline thin film according to claim 1, wherein the step of (B) is a step of locally melting the non-specific region, and continuously shifting the molten area to make the molten area pass through the specific region, thereby melting and resolidifying the specific region.

6. The process for producing a crystalline thin film according to claim 1, wherein the step (C) is carried out while continuously shifting the molten area subsequently to the preceding step.

7. The process for producing a crystalline thin film according to claim 2, wherein the step (C) is repeated while continuously shifting the area to be locally molten in one direction, whereby the

crystallized area is made to grow in the direction of shifting.

8. The process for producing a crystalline thin film according to claim 1, wherein the step (C) is a step in which the partial area is locally heated pulsewise, and molten and resolidified.

9. The process for producing a crystalline thin film according to claim 8, wherein the step (C) is repeated while shifting stepwise the area to be locally molten in one direction, whereby the crystallized area is made to grow in the direction of shifting.

10. The process for producing a crystalline thin film according to claim 8, wherein in the step (C), the area to be molten includes a part of the area crystallized in the preceding step.

11. The process for producing a crystalline thin film according to claim 8, wherein in the step (C) that is repeatedly carried out, the area to be molten includes an area that is not yet molten and resolidified.

12. The process for producing a crystalline thin film according to claim 1, wherein a spatial position of the specific region in the thin film is controlled, whereby a spatial position of at least a part of the crystal grain having a continuous crystal structure in the crystalline thin film is controlled.

13. A process for producing a crystalline thin film, comprising providing a specific region in a thin film, locally melting a partial area of the thin film, and shifting the locally molten partial area to be made to pass through the specific region.

14. The process for producing a crystalline thin film according to claim 13, wherein an area that is altered by melting of the thin film contacts only a surface having no crystal structure continuous to the crystalline thin film after alteration.

15. The process for producing a crystalline thin film according to claim 13, wherein a desired number of crystal grains or crystalline clusters grow from the specific region.

16. The process for producing a crystalline thin film according to claim 15, wherein the crystal grains or crystalline clusters are crystal grains or crystalline clusters remaining unmelted in the specific region when the thin film is molten.

17. The process for producing a crystalline thin film according to claim 16, wherein a maximum value of an accumulated energy density for melting in the specific region is smaller than a critical energy density for complete melting of the specific region, and a maximum value of an accumulated energy density for melting in its surrounding region is greater than a critical energy density for complete melting of the

surrounding region.

18. The process for producing a crystalline thin film according to claim 17, wherein the critical energy density for complete melting of the specific region is greater than the critical energy density for complete melting of the surrounding region.

19. The process for producing a crystalline thin film according to claim 18, wherein a thickness of the specific region is greater than a thickness of the surrounding region.

20. The process for producing a crystalline thin film according to claim 18, wherein a rate of thermal draining from the specific region is greater than a rate of thermal draining from the surrounding region.

21. The process for producing a crystalline thin film according to claim 17, wherein an absorption energy density of the specific region is smaller than an absorption energy density of the surrounding region.

22. The process for producing a crystalline thin film according to claim 21, wherein a density of energy deposited into the specific region is smaller than a density of energy deposited into the surrounding region.

23. The process for producing a crystalline thin film according to claim 15, wherein the crystal

grains or crystalline clusters are crystal grains or crystalline clusters nucleated from a molten phase in resolidification after melting of the specific region.

24. The process for producing a crystalline thin film according to claim 23, wherein the specific region and the surrounding region are both completely molten.

25. The process for producing a crystalline thin film according to claim 23, wherein a free energy barrier to crystal nucleation from the molten phase in resolidification of the specific region is lower than a free energy barrier to crystal nucleation from the molten phase in resolidification of the surrounding region.

26. The process for producing a crystalline thin film according to claim 25, wherein at least any one of a composition ratio of elements of the thin film, an impurity concentration, a surface adsorbate, and a state of an interface between a substrate and the thin film is different between the inside and outside of the specific region.

27. The process for producing a crystalline thin film according to claim 23, wherein a period over which a temperature of the specific region is lower than a temperature of a vicinal region of surrounding and contacting the specific region is created after the specific region of a starting thin

film reaches a maximally molten state.

28. The process for producing a crystalline thin film according to claim 27, wherein the rate of thermal draining from the specific region is greater than the rate of thermal draining from the surrounding region.

29. The process for producing a crystalline thin film according to claim 27, wherein an absorption energy density of the specific region is smaller than an absorption energy density of the surrounding region.

30. The process for producing a crystalline thin film according to claim 29, wherein a density of energy deposited into the specific region is smaller than a density of energy deposited into the surrounding region.

31. A process for producing a crystalline thin film, wherein an area including a part of a boundary between a position-controlled crystal grain of a thin film and the surrounding region is made a melting-resolidified area, and the crystal grain is made to laterally grow by a melting-resolidification step in which the melting-resolidified area is locally heated pulsewise, and molten and resolidified.

32. The process for producing a crystalline thin film according to claim 31, wherein a surface of the thin film of the melting-resolidified area

contacts only a surface of a substrate having no crystal structure continuous to the crystalline thin film.

33. The process for producing a crystalline thin film according to claim 31, wherein the melting-resolidified area includes a part of the crystal grain.

34. The process for producing a crystalline thin film according to claim 31, wherein the surrounding region of the position-controlled crystal grain is completely molten in the melting-resolidification step.

35. The process for producing a crystalline thin film according to claim 31, wherein after the melting-resolidification step, the melting-resolidified area is shifted in a direction along which the crystal grain grows, and the melting-resolidification step is carried out again, whereby the crystal grains are made to further laterally grow.

36. The process for producing a crystalline thin film according to claim 35, wherein the melting-resolidification step to be carried out again is repeatedly carried out multiple times.

37. The process for producing a crystalline thin film according to claim 35, wherein the melting-resolidified area in the melting-resolidification step to be carried out again and the melting-

resolidified area in the immediately preceding melting-resolidification step partially overlap each other.

38. The process for producing a crystalline thin film according to claim 35, wherein the melting-resolidified area in the melting-resolidification step to be carried out again includes a grain boundary of a crystal grain having a crystal structure continuous to a position-controlled crystal grain.

39. The process for producing a crystalline thin film according to claim 35, wherein the melting-resolidified area in the melting-resolidification step to be carried out again includes an area that is not yet made the melting-resolidificated area.

40. The process for producing a crystalline thin film according to claim 31, the position-controlled crystal grain is a single crystal grain provided in the specific region of a precursor of the thin film.

41. The process for producing a crystalline thin film according to claim 40, wherein the precursor of the thin film is an amorphous thin film, and the single crystal grain provided in the specific region is a crystal grain grown by solid phase crystallization of the amorphous thin film.

42. The process for producing a crystalline thin film according to claim 40, wherein the single crystal grain provided in the specific region is a crystal grain grown in the specific region by melting-resolidification of the precursor of the thin film.

43. The process for producing a crystalline thin film according to claim 42, wherein a step of providing the single crystal grain in the specific region and the step of making the single crystal grain laterally grow according to claim 31 are continuously carried out using the same heating means.

44. An element formed by using the crystalline thin film obtained in the process of claim 1, wherein a spatial position of at least a part of a crystal grain having a continuous crystal structure is determined by a spatial position of a specific region in a starting thin film, and a crystal grain having the controlled spatial position is used in an active region.

45. The element according to claim 44, wherein the active region is formed in a single crystal grain of the crystalline thin film.

46. A circuit comprising a plurality of elements of claim 45, wherein the elements are connected to one another by a wire.